

We Claim:

1. A structure for providing light, comprising:
 - a substrate;
 - 5 an amorphous oxide material overlying the substrate;
 - a monocrystalline perovskite oxide material overlying the amorphous oxide material;
 - a monocrystalline compound semiconductor material overlying the monocrystalline perovskite oxide material;
 - 10 a photovoltaic device formed using the monocrystalline compound semiconductor material; and
 - 15 a light-emitting semiconductor component formed using the monocrystalline compound semiconductor material and responsive to electrical energy produced by the photovoltaic device.
2. The structure of claim 1, further comprising:
 - a diffuser formed over the light-emitting semiconductor component.
 3. The structure of claim 1, wherein the light-emitting semiconductor component is selected from the group consisting of a light emitting diode (LED) and a vertical cavity surface emitting laser (VCSEL).
 4. The structure of claim 1, wherein the substrate includes:
 - a glass substrate; and
 - 25 a monocrystalline silicon layer overlying the glass substrate.
 5. The structure of claim 4, further comprising:
 - a thermal oxide layer between the glass substrate and the monocrystalline silicon layer.

6. The structure of claim 4, wherein the monocrystalline silicon layer is formed on the glass substrate using a lateral solidification technique.

7. A liquid crystal display (LCD), comprising:

5 a first polarizer;

a liquid crystal (LC) panel placed behind the first polarizer;

a second polarizer behind the LC panel;

10 a bandpass reflector, placed behind the second polarizer, for permitting light to pass therethrough; and

15 a back-lighting panel placed behind the bandpass reflector comprising at least one photovoltaic device for producing electric energy in response to the light, and at least one light-emitting component responsive to the electric energy produced by the at least one photovoltaic device.

15 8. The LCD of claim 7, wherein the back-lighting panel further includes:

a substrate;

an amorphous oxide material overlying the substrate;

20 a monocrystalline perovskite oxide material overlying the amorphous oxide material; and

a monocrystalline compound semiconductor material overlying the monocrystalline perovskite oxide material;

25 wherein the at least one photovoltaic device and the at least one light-emitting semiconductor component are formed using the monocrystalline compound semiconductor material.

25 9. The LCD of claim 8, wherein the substrate includes:

a glass substrate; and

25 a monocrystalline silicon layer overlying the glass substrate.

10. The LCD of claim 9, further comprising:
a thermal oxide layer between the glass substrate and the monocrystalline silicon
layer.

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11. The LCD of claim 9, wherein the monocrystalline silicon layer is formed on the
glass substrate using a lateral solidification technique.

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12. The LCD of claim 7, further comprising:
at least one diffuser formed over the at least one light-emitting component.

13. The LCD of claim 7, wherein the at least one light-emitting component is
selected from the group consisting of a light emitting diode (LED) and a vertical cavity
surface emitting laser (VCSEL).

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14. The LCD of claim 7, wherein the bandpass reflector is a holographic reflector.

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15. A process for fabricating a semiconductor structure, comprising:
providing a substrate;
depositing a monocrystalline perovskite oxide film overlying the substrate, the
5 film having a thickness less than a thickness of the material that would result in strain-
induced defects;
forming an amorphous oxide interface layer containing at least silicon and
oxygen at an interface between the monocrystalline perovskite oxide film and the
substrate;
- 10 epitaxially forming a monocrystalline compound semiconductor layer overlying
the monocrystalline perovskite oxide film; and
forming a photovoltaic device using the monocrystalline compound
semiconductor material;
- 15 forming a light-emitting semiconductor component using the monocrystalline
compound semiconductor material.
16. The process of claim 15, further comprising:
forming a diffuser over the light-emitting semiconductor component.
- 20 17. The process of claim 15, wherein the light-emitting semiconductor component is
selected from the group consisting of a light emitting diode (LED) and a vertical cavity
surface emitting laser (VCSEL).
18. The process of claim 15, wherein the step of providing the substrate includes:
25 providing a glass substrate; and
forming a monocrystalline silicon layer overlying the glass substrate.

19. The process of claim 18, further comprising:
forming a thermal oxide layer between the glass substrate and the
monocrystalline silicon layer.
 20. The process of claim 18, wherein the monocrystalline silicon layer is formed on
the glass substrate using a lateral solidification technique.
 21. A method for manufacturing a liquid crystal display (LCD), comprising:
providing a polarizer;
placing a liquid crystal (LC) panel behind the polarizer;
placing a bandpass reflector behind the LC panel, the bandpass reflector for
permitting a predetermined amount of light to pass therethrough; and
placing a back-lighting panel behind the bandpass reflector, the back-lighting
panel comprising at least one photovoltaic device for producing electric energy in
response to the predetermined amount of light, and at least one light-emitting
component responsive to the electric energy produced by the at least one photovoltaic
device.

22. The method of claim 21, further comprising:
providing a substrate;
depositing a monocrystalline perovskite oxide film overlying the substrate, the
5 film having a thickness less than a thickness of the material that would result in strain-
induced defects;
forming an amorphous oxide interface layer containing at least silicon and
oxygen at an interface between the monocrystalline perovskite oxide film and the
substrate;
10 epitaxially forming a monocrystalline compound semiconductor layer overlying
the monocrystalline perovskite oxide film; and
forming the at least one photovoltaic device using the monocrystalline
compound semiconductor material; and
15 forming the at least one light-emitting component using the monocrystalline
compound semiconductor material
23. The method of claim 21, further comprising:
forming at least one diffuser over the at least one light-emitting component.
- 20 24. The method of claim 23, wherein the diffuser is a phosphor material.
25. The method of claim 21, wherein the at least one light-emitting component is
selected from the group consisting of a light emitting diode (LED) and a vertical cavity
surface emitting laser (VCSEL).
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26. The method of claim 21, wherein the bandpass reflector is a holographic
reflector.

27. The method of claim 21, wherein the step of providing the substrate includes:
providing a glass substrate; and
forming a monocrystalline silicon layer overlying the glass substrate.
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28. The method of claim 27, further comprising:
forming a thermal oxide layer between the glass substrate and the
monocyrstalline silicon layer.
- 10 29. The method of claim 26, wherein the monocrystalline silicon layer is formed on
the glass substrate using a lateral solidification technique.